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Proceedings of the regional peer review meeting on the Assessment of the Estuary and Gulf of St. Lawrence Shrimp Stocks

**January 23, 2014
Mont-Joli, Québec**

**Chairperson: Stéphane Plourde
Rapporteure : Sonia Dubé**

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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MPO. 2014. *Compte rendu de l'examen régional par des pairs sur l'évaluation des stocks de crevette de l'estuaire et du golfe du Saint-Laurent; 23 janvier 2014. Secr. can. de consult. sci. du MPO, Compte rendu 2014/005.*

SUMMARY

This document contains the proceeding from the meeting held within the regional assessment process of the Estuary and Gulf of St. Lawrence Shrimp Stocks. This review process was held on January 23th, 2014 at the Maurice Lamontagne Institute in Mont-Joli. This meeting gathered forty participants from sciences to management to industry. This proceeding contains the essential parts of the presentations and discussions held and relates the recommendations and conclusions that were presented during the review.

SOMMAIRE

Ce document renferme le compte rendu de la réunion tenue dans le cadre du processus régional d'évaluation des stocks de crevette de l'estuaire et du golfe du Saint-Laurent. Cette revue, qui s'est déroulée le 23 janvier 2014 à l'Institut Maurice-Lamontagne à Mont-Joli, a réuni quarante participants des sciences, de la gestion et de l'industrie. Ce compte rendu contient l'essentiel des présentations et des discussions qui ont eu lieu pendant la réunion et fait état des recommandations et conclusions émises au moment de la revue.

INTRODUCTION

The Quebec Region of the Department of Fisheries and Oceans (DFO) is responsible for assessing the stocks of several exploited fish and invertebrate species in the Estuary and Gulf of St. Lawrence. Most of these stocks are assessed periodically within a regional advisory process, which is conducted at the Maurice Lamontagne Institute in Mont-Joli. This document consists of the proceedings of the meeting held on January 23, 2014 on the assessment of the Estuary and Gulf of St. Lawrence shrimp stocks.

The objective of the meeting was to determine whether there were any changes in the resource's status and whether adjustments were required to the management plans based on the chosen conservation approach, the ultimate goal being to provide scientific advice on managing the shrimp stock in the Estuary and Gulf of St. Lawrence for the 2014 fishing season.

These proceedings report on the main points discussed in the presentations and deliberations stemming from the activities of the stock assessment regional committee. The regional review is a process open to all participants who are able to provide a critical outlook on the status of the assessed resources. In this regard, participants from outside DFO are invited to take part in the committee's activities within the defined terms of reference for this review (Appendices 1 and 2). The proceedings also mention recommendations made by the meeting participants.

CONTEXT

Meeting chairperson Stéphane Plourde welcomes the participants. He goes over the scientific review's objectives and agenda. After the participants introduce themselves, the biologist in charge of the review, Hugo Bourdages, highlights the contribution of his collaborators. He also refers to two research documents containing detailed information on commercial fishery data and the research survey. He presents the meeting agenda and terms of reference. This review will be used to provide scientific advice for the 2014 fishing season.

A synopsis of the fishery management measures is given. There are four fishing areas (Estuary, Sept-Îles, Anticosti and Esquiman) and 140 licences (five provinces and seven First Nations). Each area is subject to catch monitoring through the application of a total allowable catch (TAC). Trends in landings are briefly presented. A history of the shrimp life cycle is also presented to show the harvesting periods based on development stages. The data used in the assessment come from the commercial fishery (1982–2013) and the DFO research survey (1990–2013).

ASSESSMENT OF THE RESOURCE

COMMERCIAL FISHERY

Mr. Bourdages presents commercial fishery indicators for each area (landings, effort, CPUE, length frequency). In 2013, landings totalled 32,160 t out of a TAC of 33,112 t. The TAC was reached in all areas. The same areas are fished by shrimp harvesters from one year to the next. Since 2003, total fishing effort has been below the historical average. In 2013, the standardized catch rate from the fishery decreased, yet remained in the average range, in the Estuary and Sept-Îles, whereas it was stable and high in Anticosti and Esquiman.

- It is stated that fishing effort corresponds to the number of hours fished recorded in the logbook (hard copy or digital).

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- It is mentioned that catch rate standardization considers "effect of month" and therefore takes a change in the time frame of the fishery into account.
 - The main indicator of stock status is calculated using the male and female indices (NPUE) obtained from the summer fishery. A few clarifications are made on how to calculate this indicator, which also includes the abundance of males and females in the survey.
 - Questions are asked about what could explain the decrease observed in 2013 in the male (NPUE) index in the Esquiman area: decreased abundance, change in fishing pattern, gear selectivity. It is mentioned that this decrease is also observed in the survey.

RESEARCH SURVEY

Mr. Bourdages presents indicators from the DFO research survey (biomass, abundance, length frequency) for each area. The survey's biomass index has been stable in all areas for the past three years (2011–2013), but it decreased between 2007 and 2011. The demographic structures show that the individuals likely to change sex during the 2014 winter were well represented in 2013 in the Sept-Îles, Anticosti and Esquiman survey. However, the recent year classes (2010 and 2011) seemed to be of average to low abundance in all areas.

- A few clarifications are made on the sampling plan and the 2013 survey. The northern Gulf, specifically the Strait of Belle Isle and northern Esquiman, is the least covered area (more complex topography). Generally, the 2013 survey presents good coverage of the areas where shrimp are observed.
- The biomass distribution raises a question: Is spillover possible south of the area covered by the survey? There are data for the southern Gulf (the southern survey), but they are still not comparable given the difference in vessel and fishing gear. It would still be worthwhile to give this question special attention.
- Generally, fishery yields are somewhat consistent with trends observed in the survey. In the case of Anticosti, there seems to be a slight discrepancy in recent years. Northern and southern Anticosti may have to be divided to allow for a better comparison. The fact remains that there are still benefits to using both data sources (fishery and survey) in calculating the main indicator of stock status given strong consistency in the past.
- A question remains regarding the high 2003 value, which is also observed in other species and may be related to an anomaly in the cold intermediate layer (compression of the demersal layer). Some participants say that this value could have an impact on our interpretation of the survey index trend.
- There are questions about the relevance of integrating the new, shallower strata surveyed in the Estuary since 2008, and therefore working with a series that, although shorter, offers better coverage of the area.
- The decrease observed in males (fishery and survey) portends a decrease in females.
- The participants say that length frequencies may suggest a recruitment gap. Unusual environmental conditions between 2010 and 2012 are blamed for a decrease in larval survival.

EXPLOITATION RATE

The biologist presents an exploitation rate index (shrimp caught [n]/survey abundance [n]), which increased in the Estuary and Sept-Îles but decreased in Anticosti and Esquiman in 2013.

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- The participants are reminded that a variation in TAC has an impact on the exploitation rate. Ideally, maintaining a relatively constant exploitation rate should be targeted.

PRECAUTIONARY APPROACH

The methodology used for the precautionary approach is presented. The main indicator of stock status is calculated from the standardized indices of males and females in the summer fishery and the research survey. This indicator shows that the stocks were in the healthy zone in 2013. However, relative to 2012, the indicator in 2013 decreased by 45%, 25% and 12% in the Estuary, Sept-Îles and Esquiman, respectively, and increased by 19% in Anticosti.

- The main discussion centres on significant fluctuations in TAC levels since the precautionary approach was implemented. The industry feels that these fluctuations are difficult to manage and the fishers do not find this approach justifiable.
- The participants are reminded of the context that led to the development of the precautionary approach and decision rules, which are the product of a rigorous process that was agreed upon by Science, management and industry representatives. However, a review of this approach was to take place in the years following its application.
- Some participants would like to review these rules quickly, but representatives of Sciences and Management mention that we must wait a certain period before we can verify the effectiveness of these.
- The second item raised concerns the validity of the main indicator of stock status, which many participants say should also be reviewed. Its components must be re-examined.

BYCATCHES

Mr. Bourdages gives an overview of bycatches in the shrimp fishery (Atlantic Cod, redfish, Greenland Halibut, American Plaice, Witch Flounder, capelin). These catches represent between 1.0 and 2.6% of Northern Shrimp catches for the period from 2000 to 2013. They represent less than 1% of the biomass estimates in the survey for each species.

- In 2013, a large quantity of small redfish was observed in all fishing areas. However, this does not appear problematic in terms of shrimp harvesters' impact on this resource. However, if these redfish remain in the Gulf, they may eventually have an impact on shrimp.

OUTLOOK

A temperature profile of the bottom of the Gulf of St. Lawrence is presented. Warm water has been entering through the Cabot Strait in recent years, which is felt in Esquiman and Anticosti, and will have an impact on the Estuary in a few years.

- The possible impact of this warm water entry on shrimp is briefly discussed: shorter incubation time, faster growth, sex change at a smaller size, delay in phytoplankton blooms, etc.
- A return to a lower temperature is nonetheless expected.

RESEARCH

The biologist briefly presents the list of shrimp research projects conducted at MLI over the past two years, those currently underway, and upcoming projects (Appendix 3).

CONCLUSION

SUMMARY

The highlights of the assessment are presented and the participants share their comments.

- The purpose of the main discussion is to draw up the Science recommendation as part of the precautionary approach and the new guidelines. There are questions on what falls under Science and what falls under management: How detailed should the scientific advice be? In the end, the wording below is agreed upon.

RECOMMENDATION

Harvest guidelines were established according to the main indicator and its position in relation to the stock status classification zones (healthy, cautious and critical) in compliance with the precautionary approach. According to the guidelines, the projected harvest for 2014 is 802 t for the Estuary, 10,570 t for Sept-Îles, 9100 t for Anticosti and 8248 t for Esquiman. Decision rules were established to calculate TAC from the main indicator of stock status.

APPENDIX

1- PARTICIPANTS LIST

Name	Affiliation
Archambault, Diane	DFO – Science
Bourdages, Hugo	DFO – Science
Brassard, Claude	DFO – Science
Castonguay, Martin	DFO – Science
Chabot, Denis	DFO – Science
Chiasson, Hector	ACAG
Côté, Mario	ACPG
Cotton, Dave	ACPG
Courtemanche, David	DFO – Fisheries management
Cyr, Charley	DFO – Science
Dallaire, Jean-Paul	DFO – Science
Desgagnés, Mathieu	DFO – Science
Dubé, Sonia	DFO – Science
Dupuis, Dan	ACPG
Gauvin, Basile	ACAG
Goudreau, Patrice	DFO – Science
Grégoire, François	DFO – Science
Hardy, Magalie	DFO – Fisheries management
Lambert, Jean	DFO – Science
Lambert, Yvan	DFO – Science
Langelier, Serge	AMIK
Lanteigne, Jean	FRAPP
Légaré, Benoît	DFO – Science
Légère, Michel	ACAG
Maltais, Dornynick	DFO – Science
Marquis, Marie-Claude	DFO – Science
McQuinn, Ian	DFO – Science
Metallic, Christopher	LMG First Nation
Morneau, Renée	DFO – Science
Morin, Bernard	DFO – Fisheries management
Ouellet, Patrick	DFO – Science
Plourde, Stéphane	DFO – Science
Poulin, Jean-Michel	MAPAQ
Roussel, Eda	ACAG
Sainte-Marie, Bernard	DFO – Science
Samuel, Sylvain	ACPG
Sandt-Duguay, Emmanuel	AGHAMM
Savenkoff, Claude	DFO – Science
Schwab, Philippe	DFO – Science
Trottier, Steve	DFO – Science

2- TERMS OF REFERENCE

ASSESSMENT OF ESTUARY AND GULF OF ST. LAWRENCE SHRIMP STOCKS

Regional Peer Review - Quebec Region

January 23, 2014
Mont-Joli, Qc

Chairperson: Stéphane Plourde

Context

The Estuary and northern Gulf of St. Lawrence are divided in four shrimp fishing areas (SFA): Estuary (SFA 12), Sept-Iles (SFA 10), Anticosti (SFA 9) and Esquiman (SFA 8). Shrimp fishing is regulated by a number of management measures, including the setting of total allowable catches (TAC) in the four areas.

The key elements for the establishment of a precautionary approach (PA) were adopted in 2012. Reference points were determined and guidelines have been established to determine harvest based on the stock status main indicator and its position relative to healthy, cautious and critical zone classification.

Objectives

Provide scientific advice for the management of Northern Shrimp stocks in the Estuary and Gulf of St. Lawrence (SFA 8, 9, 10 and 12) for the 2014 fishing season. This advice shall include:

- Analysis of commercial fishery data including landings, effort, catch per unit of effort and data from the commercial sampling program;
- Data analysis of the DFO research surveys in August in the estuary and northern Gulf.
- Update of the main stocks status indicator.
- A recommendation on harvest according to PA guidelines for the 2014 fishing season.
- Comment the outlook for stock abundance.
- Estimate by-catches (among others, Redfish, Turbot, Northern Cod and Capelin) during the directed fishery on Northern Shrimp.
- Identification and prioritization of research projects to be considered for the future.

Expected Publications

- CSAS Science Advisory Report on Estuary and Gulf of St. Lawrence shrimp.
- CSAS Research documents
- CSAS Proceedings summarizing discussions.

Participation

- DFO Science and Fisheries Management
- Fishing industry
- Provincial representatives
- Aboriginal Communities / Organizations

3- RESEARCH PROJECTS

Publications of the last two years:

- Savard L. and Nozères, C. 2012. Atlas of Shrimps of the Estuary and Northern Gulf of St. Lawrence. Can. Tech. Rep. Fish. Aquat. Sci. 3007: vi + 67 p.
- DFO. 2012. Assessment of the impact of northern shrimp trawling on benthic habitats communities in the Estuary and northern Gulf of St. Lawrence. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/054.
- DFO. 2013. Importance of bycatch in the northern shrimp fishery in the Estuary and northern Gulf of St. Lawrence. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/066.

Ongoing research projects at MLI

- Assessing the response of Northern shrimp (*Pandalus borealis*) populations to climate change and variability - Science program – International Governance Strategy, 2011-2014. Patrick Ouellet, Denis Chabot (MFO, MLI) ; David Orr (DFO, NWAFC) ; Piero Calosi (University of Plymouth, UK)
- Integration of climate changes and ecosystem parameters into northern shrimp and Greenland halibut stock assessment processes - Aquatic Climate Change Adaptation Services Program, ACCASP (adaptation tools), 2013-2016. Claude Savenkoff, Hugo Bourdages, Peter Galbraith, Richard Larocque, Martin Castonguay (DFO, MLI) ; Joël Chassé (DFO, CPG) ; Sandrine Vaz (IFREMER, France) ; Stéphane Dumont (DFO, Small Craft Harbours), Dario Lemelin (DFO, Ecosystems and Fisheries Management)
- Trophic interactions (predators and prey species) and main mortality causes related to the northern shrimp (*Pandalus borealis*) in the Estuary and northern Gulf of St. Lawrence (2011-2014) - 2013-2016 Claude Savenkoff, Hugo Bourdages, Denis Chabot (DFO, MLI)

Future research projects at MLI

- Distribution, spatial structure and vulnerability to trawling of sea pen fields in the Gulf of St. Lawrence (GSL) - Strategic program for ecosystem-based research and advice (SPERA), 2014-2017 (letter of intent). Bernard Sainte-Marie, Hugo Bourdages, Catherine Couillard, Richard Larocque, Claude Savenkoff (DFO, MLI) ; Marc Ouellet (DFO, CPG) ; Gilles H. Tremblay, Simon Cadieux (DFO, Oceans Management)
- Utilisation des données SSN (système de suivi des navires) - 2014-2016 Hugo Bourdages (MPO, IML)
- Use of VMS data (vessel monitoring system) - 2014-2016 Hugo Bourdages (DFO, MLI)